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INSTRUMENT SHOP

BIRD

INSTRUCTION book

MODEL 8251

INSTRUCTION MANUAL

for

Model 8251 TERMALINE®

Coaxial Load Resistor

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Model 8251 TERMALINE®

RF Load Resistor

SUMMARY SPECIFICATIONS

Power Rating	1000 watts
RF Input Impedance	50 ohms
Frequency Range	DC to 2500 MHz
VSWR	1.10 max. DC to 1000 MHz 1.25 " 1000 to 2000 MHz 1.30 " 2000 to 2500 MHz
Ambient Temp. Range	-40°C to +45°C
Input Connector	Female LC Bird "QC" Normally Supplied
Operating Position	Horizontal only with vent plug up.

MECHANICAL SPECIFICATIONS

Weight	24 lbs. (11 kg)
Dimensions	17-29/32" lg x 5-15/16" w x 8-1/2 (454.8 x 150.8 x 215.9 mm)
Mounting Dimensions	15" x 5-1/8" Rectangle (381 x 130.2 mm)
Finish	Navy Gray Enamel (MIL-E-15090)

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Model 8251 TERMALINE®

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Model 8251 TERMALINE® RF Load Resistor

Section I - General Description

General

The Bird Model 8251 TERMALINE® Load Resistor is a portable, general purpose 50-ohm coaxial transmission line termination. It is a self-contained unit requiring no outside power source or additional equipment. The Coaxial Load provides an accurate, dependable, and practically non-reflective termination for testing and adjusting transmitters under non-radiating conditions from DC to 2500 MHz. See Summary, Page -A-.

The Model 8251 is rectangular in shape with transverse fins encasing a dielectric coolant cylinder. A rectractible handle is recessed in the radiator fins. The front and rear fins are made of heavier gauge material and are bent 90° to form bottom mounting flanges. These flanges are supports for free standing use, or brackets for fixed mounting. Flange holes are provided for this purpose, see Installation, Section III.

The RF input connector on the front face is a Female LC, and is a patented "Quick-Change" design allowing rapid and easy interchange with other AN type connectors, See Section V.

Purpose and Use

The Model 8251 is useful for the following purposes: -

a. As a substitute antenna.

   (1) For tuning transmitters - under non-radiating conditions.
   (2) For making routine tests and adjustments.

b. As a substitute for any circuit loading Element.

c. To measure, with a suitable indicating device, the power output of any coaxially transmitted signal within its rating.

Section II - Theory of Operation

The Model 8251 equipment consists essentially of a carbon film-on-ceramic resistor immersed in a dielectric coolant. The resistor, individually selected for its accuracy, is enclosed in a special exponentally tapered housing. This provides a linear reduction in surge impedance directly proportional to the distance along the resistor. When surrounded by the dielectric coolant, the characteristic impedance is therefore 50 ohms at the front (connector end), 25 ohms at the mid-point to compensate for the resistance already passed over, and zero ohms at the rear where the resistor joins the housing, forming the return conductor of the coaxial circuit. This produces the uniform, practically reflectionless line termination over the stated frequencies of the load resistor.

The dielectric coolant is chosen for its desirable dielectric and thermal characteristics. Cooling of the Model 8251 is accomplished by natural fluid and air convection. The dielectric coolant carries the electrically generated heat from the resistor to the walls of the cylindrical cooling tank. This tank is encased in a set of radiating fins constructed from heavy gauge aluminum alloy, which are firmly pressed on the cylinder. The heat from the dielectric oil is transferred to the surrounding air by radiating fins.

When the coolant oil is heated, thermal expansion causes this oil to flow up into an expansion tank mounted on the upper side of the rear of the radiator. This overflow tank, equipped with a breather plug at the top for venting, is fed by a copper tube leading from the rear cover of the radiator cylinder into the bottom of the expansion tank. The system, arranged such that no oil will be trapped outside of the main cylinder, is protected against external damage by a strong steel box-type cover.

Section III - Installation

The Model 8251 Load Resistor may be used for portable operation or for fixed installation, that is, it may stand free or may be secured to a bench or any convenient flat surface. If it is desired to fasten the load by means of its base mounting flanges, four 9/32" holes, for use with screws up to 1/4" diameter, are provided. These holes are arranged in a 5-1/8" x 15" rectangle (130.2 x 381 mm). The load is designed for operation in a horizontal plane only, with mounting brackets down. NOTE: DO NOT OPERATE IN ANY OTHER MANNER. Allow room for air circulation around and above the radiator unit when the load resistor is in use. For power over 300 watts, keep at least six inches of free air space on the sides and top of the unit.

IMPORTANT

Before any power is applied to this load equipment the shipping plug must be removed and replaced by the Breather Vent #5-835. Do not operate the TERMALINE® until the solid plug has been removed.

Section IV - Operation

Having no indicators or controls, the Dummy Load requires no special operating procedures or surveillance when properly used. When power loaded in upper range of its capacity the radiator will become hot - care should be used in contacting the equipment.

Connect the Model 8251 to the power source under test by means of a suitable coaxial power cable. Use patch cord of 50-ohm cable, such as RG-17/U, RG-18A/U, or -218/U with a Type LC cable plug (of the UG-154/U series). Check that all coaxial power line connections are properly tightened. Proceed according to instructions pertaining to specific equipment involved.

Due to the difference in VSWR between the Dummy Load and the transmitter's antenna, re-adjustment of the transmitter may be required when returning to the original antenna.

CAUTION

DO NOT operate this equipment over the rated 1000 watts continuously.

Section V - Maintenance

General

The Model 8251 is rugged and simple, requiring only nominal routine care. It is designed to operate for long periods of time, if care is taken not to exceed its power handling capabilities.

The outside surface of the instrument should be wiped free of dust and dirt when necessary. Clean the RF input connector with Inhibisol, its equivalent, or trichlorethylene on a cotton swab stick. Take special care to clean the metallic contact surface and exposed face of the teflon insulator. Provide adequate ventilation and observe normal precaution when using solvents.

Load Resistor

Accurate measurement of the DC resistance between the inner and outer conductors of the input coupling will provide a good check of the condition of the load resistor. For this measurement, use a Resistance Bridge with an accuracy of one percent or better at 50 ohms, such as Leeds & Northrup Model 5305 Test Set. Use low resistance leads, preferably a short piece of coaxial cable attached to an appropriate plug.

If the load resistor is found to be defective, the Load Resistor Assembly should be replaced in its entirety. To replace the load resistor assembly proceed with the steps that follow:-

(1) Replace the vent plug (P/N 5-835) with the shipping plug (P/N 2450-049) in the filler hole of vent tank to prevent coolant drain out. (See coolant section).

(2) Stand the unit on its back end i.e., vertically with the connector end up. Brace unit in this position to prevent unit from tipping.

Section V - Maintenance (Continued)

Load Resistor (Continued)

(3) Loosen the #10-32 x 1-1/2" screw on the clamping band until free and remove the clamping band.

(4) Grasp the LC connector and slowly lift the load resistor assembly out of the radiator cylinder allowing excess coolant to drip back in.

(5) If undamaged, the LC "QC" connector may now be removed for further use - See RF Input Connector Section for removal. No further disassembly is required.

(6) Before replacing a load resistor assembly (RF Section P/N 8890-050) inspect the O-ring seal (P/N 5-230) to be sure it is in good condition and placed properly. It should be free of twists and positioned evenly around the beveled flange of the resistor housing. Do not reuse an O-ring unless it is in good condition.

(7) When replacing a load resistor assembly, reverse the procedure listed above. Be sure to replace Vent Plug.

Coolant

The level of the dielectric coolant fluid should remain constant in the unit after prolonged usage under normal operating conditions. Inspect occasionally around lower portion of both clamping bands for possibility of coolant leakage. Tighten clamping screw if required. Under very unusual conditions it might be necessary to replace the resistor housing seal O-ring. Proceed as described in previous paragraph.

Coolant (Continued)

To check coolant level, remove vent plug from the socket on the top surface of the expansion tank. Unscrew the plug with a 3/4-inch wrench. The coolant, at room temperature, should not be more than 1/8-inch above the bottom surface of the expansion tank. This may be checked by carefully tilting up the front of the load and noting presence of coolant on bottom surface. The coolant quantity should be sufficient to fill the radiator cylinder. The unit is factory-filled to the proper level with 1.1 gallons (4.1 liter) of Bird P/N 5-1070. NO OTHER COOLANT MAY BE USED.

Miscellaneous

Other portions of the equipment may be replaced for purely mechanical reasons. Handling of this should be relatively easy for anyone accustomed to mechanical assemblies. The important items follow hereunder:-

Rear cover and seal on radiator tank: Before loosening rear end (if the coolant is not drained from the tank) the radiator should be stood on end with nose pointed down.

(1) Unscrew the four #10-32 truss head screws at the corners of the Guard Cover (P/N 2430-078) and remove guard box.

(2) Unscrew the Tube Nut from tank nozzle and pull free.

(3) Unscrew clamp screw from bottom of V-band (same type as at front) and remove V-band clamp.

(4) The rear cover (which includes attached escape tube with captive nut) (P/N 2430-088) and the Diaphragm Seal (P/N 2430-089), may now be easily removed.

Section V - Maintenance (Continued)

Miscellaneous (Continued)

(5) In replacing, reverse procedure above. Be sure to inspect the diaphragm seal and replace if found to be defective.

The expansion tank is vented through the Breather Plug (P/N 5-835) screwed into the top. The unit unscrews from the socket, but is not itself subject to disassembly. The seat is sealed by the compressed O-ring (P/N 5-502) which should be included when replacing the breather.

Radiator Handle: The radiator handle slides on and is held captive by the two retaining studs riveted to the fins. It may be removed or replaced by the following method:-

(1) With a large screwdriver covered with a rag, or a suitable wooden stick, gently pry apart the fins adjacent to each of the respective studs just enough to clear the handle thickness.

(2) When fins are pryed apart sufficiently, slide each leg over the end of the respective stud.

RF Input Connector

The input connector is of the special quick-change (QC) design, which permits facile interchange of connectors with only simple tools. This process does not in anyway disturb the coolant seal or interfere with the essential coaxial continuity of the load resistor RF input.

If replacement of the RF input (QC) connector becomes necessary, proceed as follows:

(1) Remove the four #8-32 x 5/16 round head machine screws from the corners of the RF connector.

Section V - Maintenance (Continued)

RF Input Connector (Continued)

(2) Pull connector straight out.

(3) Reverse above procedure to install new connector, making certain that the projecting center contact pin of the "QC" connector is carefully engaged and properly aligned with the mating socket of the load resistor.

The "QC" connector may be readily replaced with other Standard AN Type connectors. See list below for available types.

Available "QC" Connector Types

N - Female	4240-062	LC - Female	4240-031
N - Male	4240-063	LC - Male	4240-025
HN - Female	4240-268	LT - Female	4240-018
HN - Male	4240-278	LT - Male	4240-012
C - Female	4240-100	UHF - Female (SO-239)	4240-050
C - Male	4240-110	UHF - Male (SO-259A)	4240-179

7/8" EIA Air Line - 4240-002

Model 8251 TERMALINE® Load Resistor

Section VI

Replacement Parts List

Qty.	Description	Part Number
1	RF Section	8890-050
1	Connector, Female LC	4240-031
1	O-Ring, RF Section	5-230
1	Guard, Diaphragm, Cover	2430-078
1	Cover, Assy., Diaphragm	2430-088
1	Seal, Diaphragm	2430-089
2	Clamping Band (with screw)	2430-055
1	Coolant, (1.1 gallon) (4.1 liter)	5-1070
2	O-Ring, Vent & Shipping Plug	5-502
1	Breather, Vent	5-835
1	Radiator	2430-123
(1)	Tank Expansion, P/O Radiator	2430-080
1	Handle, Radiator	2430-028
(1)	Plug, Shipping	2450-049

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